



Armed Forces College of Medicine

AFCM

Neuroscience Module/ Prof Azza Kamal



The Cerebral Hemispheres

BY

Prof Azza Kamal

&

Dr Walaa Baher

Intended Learning Outcomes

By the end of this lecture , the student will be able to:

- 1. List the layers of the cerebral cortex and the cells forming them.**
- 2. Compare between the structure of the sensory and motor cortex.**
- 3. Name the major sulci, gyri, poles & lobes of the cerebral hemispheres.**

Layers of the cerebral cortex



The Cerebral Cortex is formed of six (6) layers



1) Molecular layer:

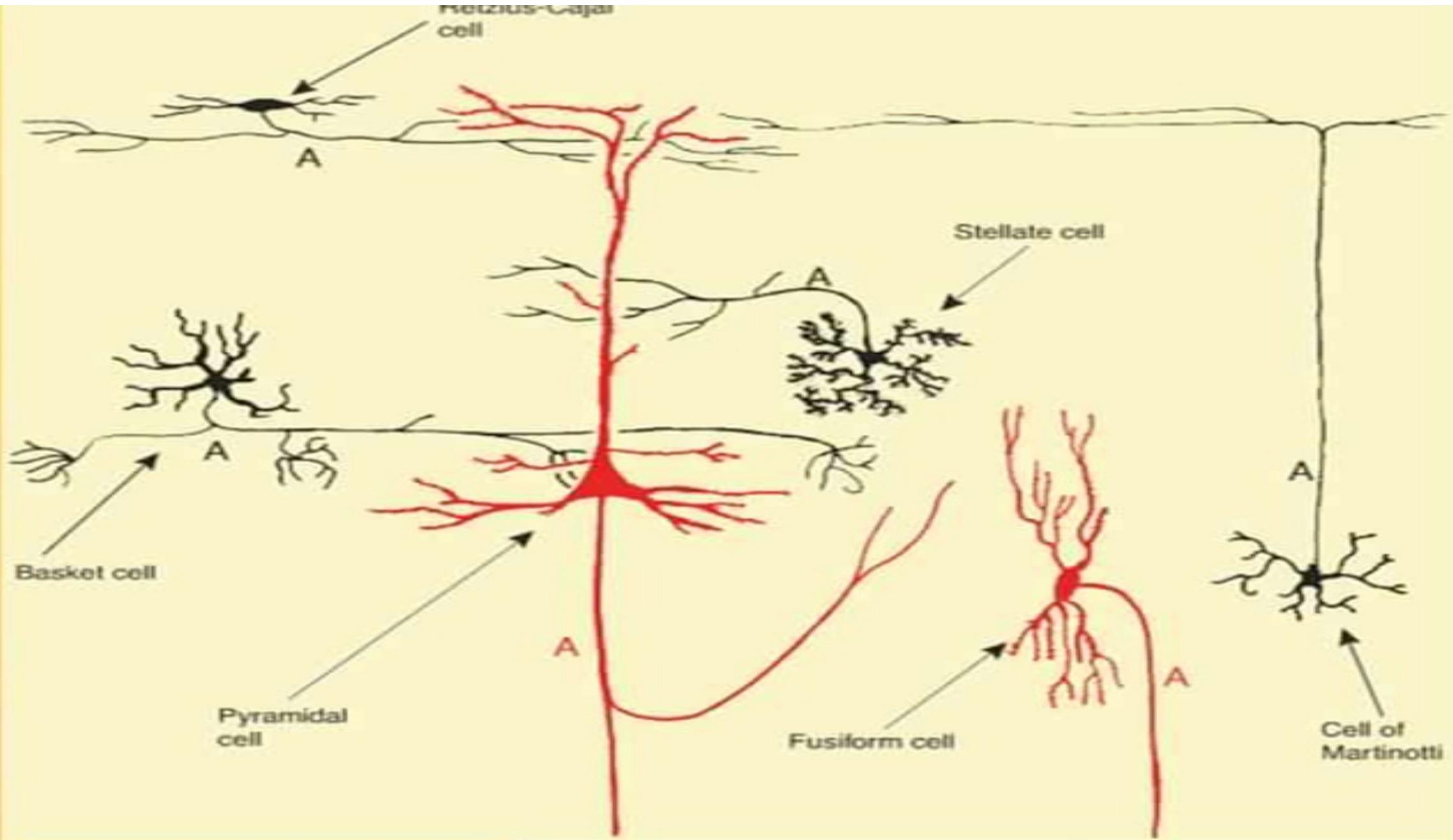
Most superficial layer.

Formed mainly of interlacing nerve fibers and cells of Cajal (absent in adult brain).

Nerve fibers include terminal dendrites of pyramidal and fusiform cells and axons of Martinotti cells

2) External granular layer:

- It is formed of closely packed granule cells.
- Their dendrites terminate in the molecular layer.
- Their axons descend to the deep cortical layers.



Layers of the cerebral cortex



3) External pyramidal layer:

- It contains superficial layer of small and medium sized pyramidal cells and deep layer of larger cells.
- Their dendrites pass to the first layer, while their axons enter the white matter.

4) Internal granular layer:

- It is formed of closely packed granule cells.
- Their dendrites terminate in the molecular layer
- Their axons descend to the deep cortical layers.
- It also contains the outer band of Baillarger.



5) Internal pyramidal layer:

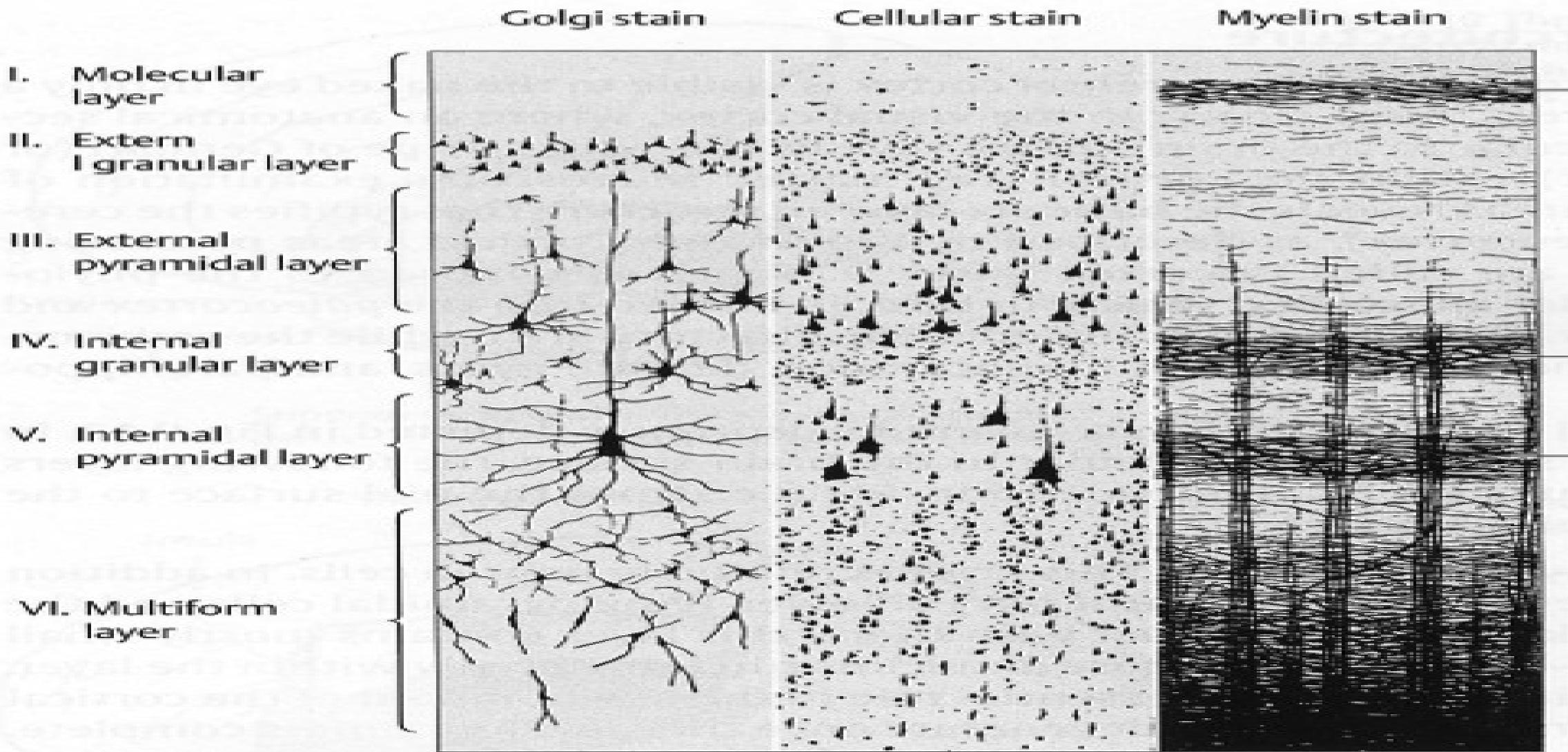
- Formed of large and giant pyramidal cells.
- Their dendrites pass to the fourth layer
 - Their axons project to enter the white matter as projection fibres (origin of pyramidal tract). **In motor area 4 these cells called giant cells of Betz.**
 - It also contains the internal band of Baillarger.

6) The mutiform layer:

It contains fusiform cells.

Their dendrites pass to the molecular layer

- Their axons enter the white matter as projection fibres.



http://www.learnneurosurgery.com/uploads/1/6/6/8/16689668/_8909191_orig.png

Differences between sensory and motor cortex



Motor cortex

- 1) It is the thickest zone in the whole cortex.
- 2) Large pyramidal cells are found in layers III and V , while giant pyramidal cells (Betz) are seen in the fifth layer.
- 3) Granule cells are rare or absent.

Sensory cortex

- 1) It is relatively thinner than motor cortex.
- 2) It contains closely packed granule cells.
- 3) Pyramidal cells are ill defined.

Quiz



1) **Which of the following cells are not found in the cerebrum:**

- a) Pyramidal cells.
- b) Purkinje cells.
- c) Granule cells.
- d) Fusiform cells.
- e) Cells of Martinotti

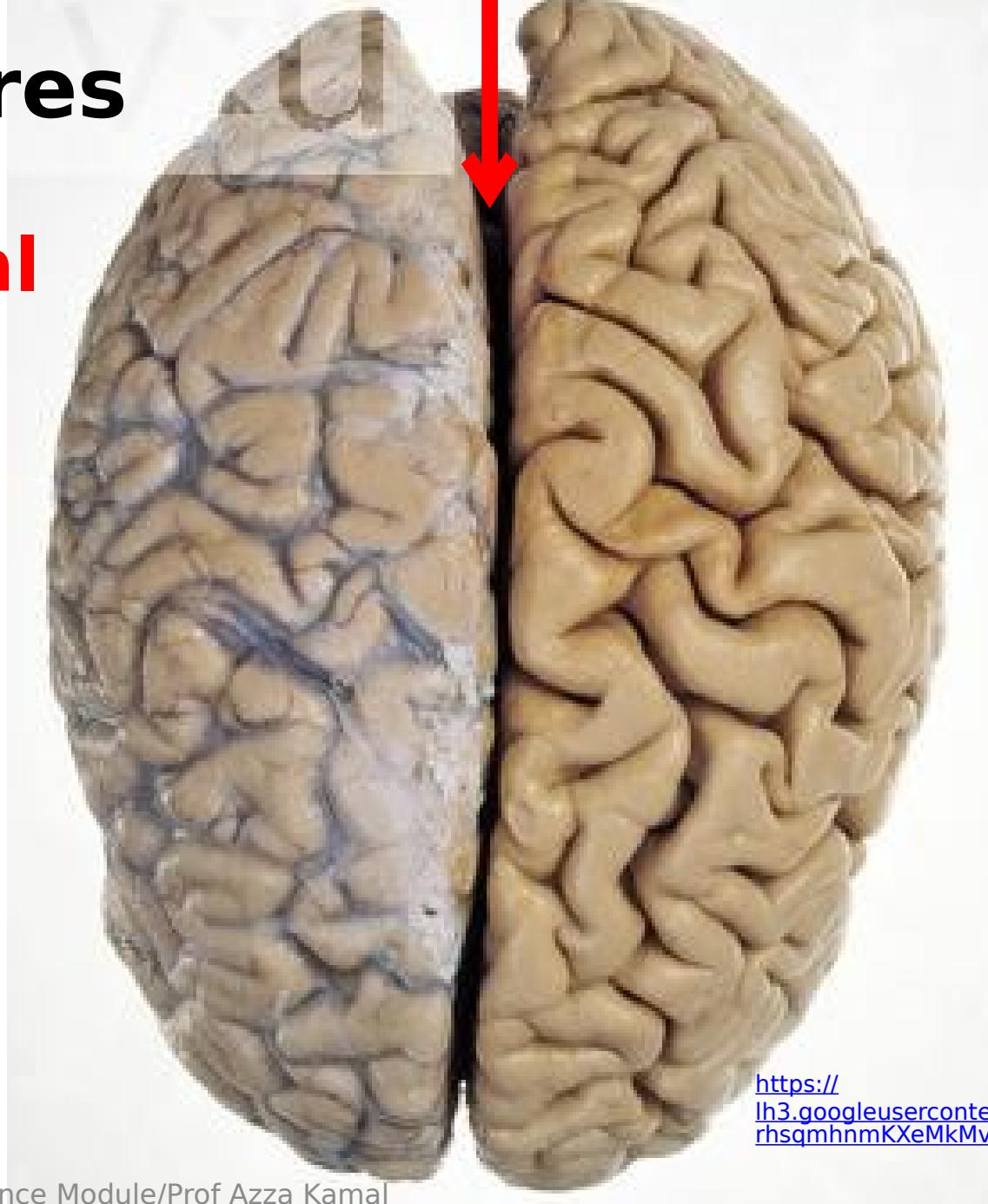
2) **Giant cells of Betz are present in the following layer of the cerebral cortex :**

- a) Pleomorphic
- b) External granular
- c) Internal granular
- d) External pyramidal.
- e) Internal pyramidal.

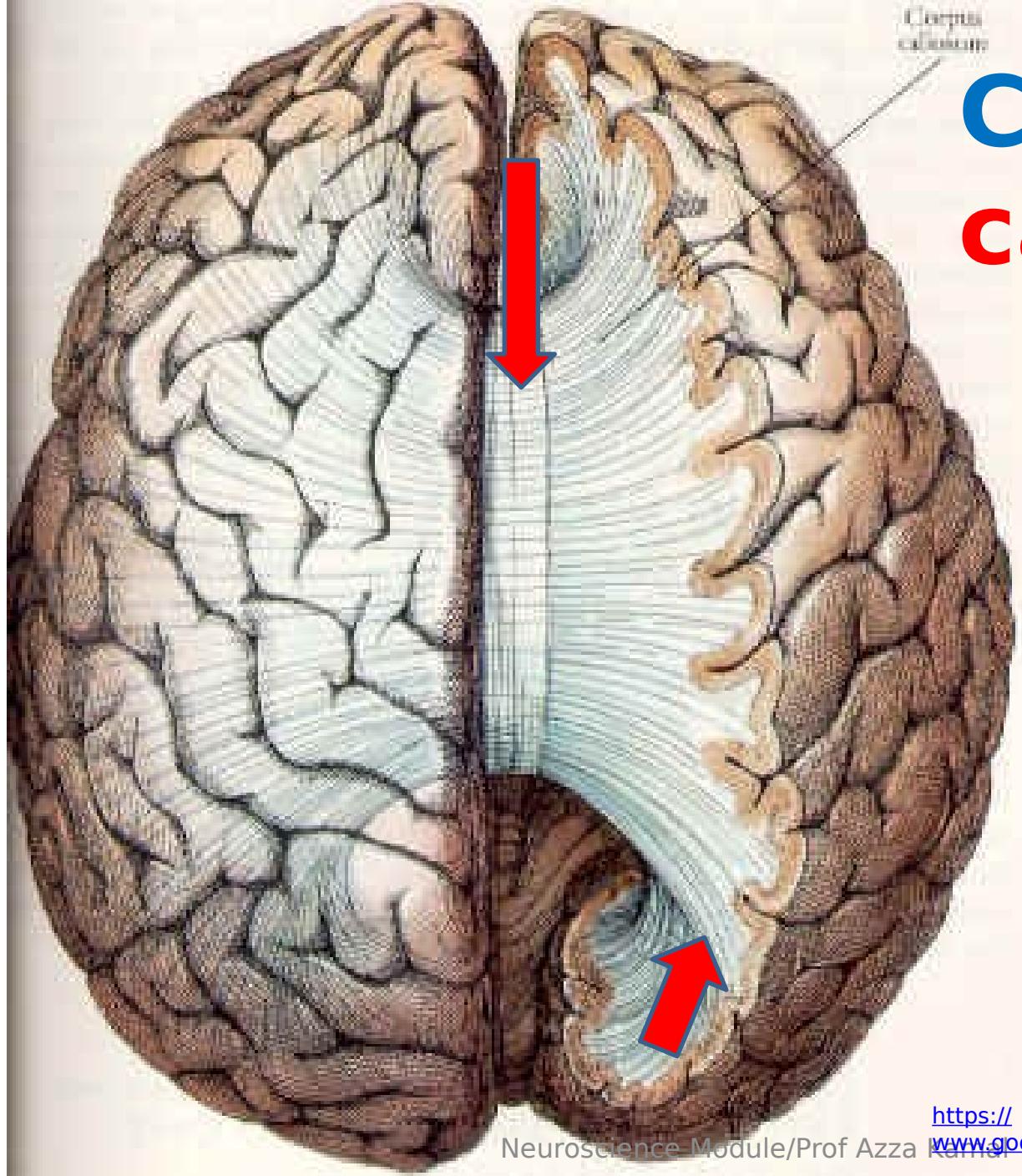
The cerebral hemispheres

**Right & left
cerebral
hemispheres**

**Longitudinal
fissure**

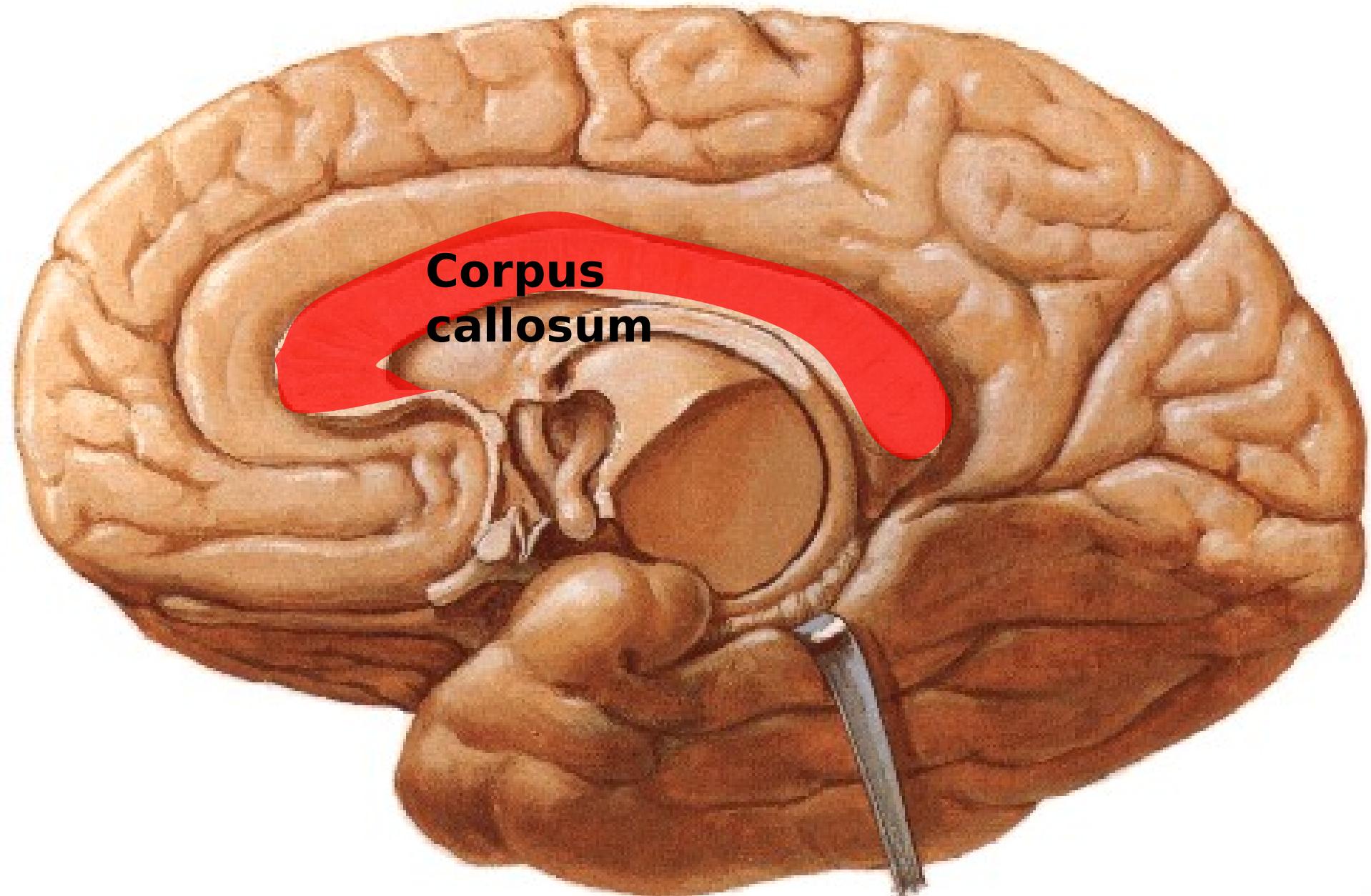


[https://
lh3.googleusercontent.com/
rhsqmhnKXeMkMvIVDXd](https://lh3.googleusercontent.com/rhsqmhnKXeMkMvIVDXd)

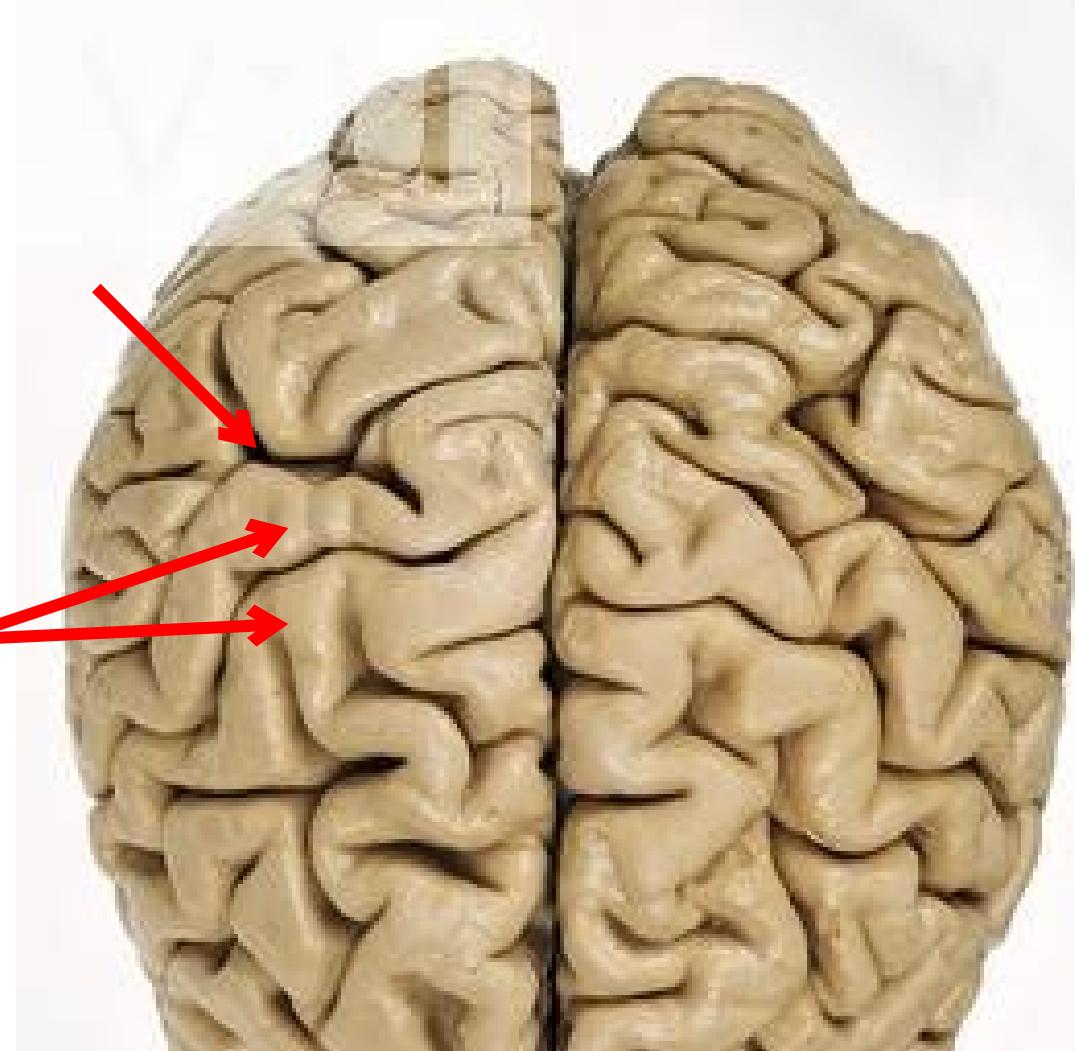


Corpus callosum

**Commissural
fibers which
connect the right &
left hemispheres**



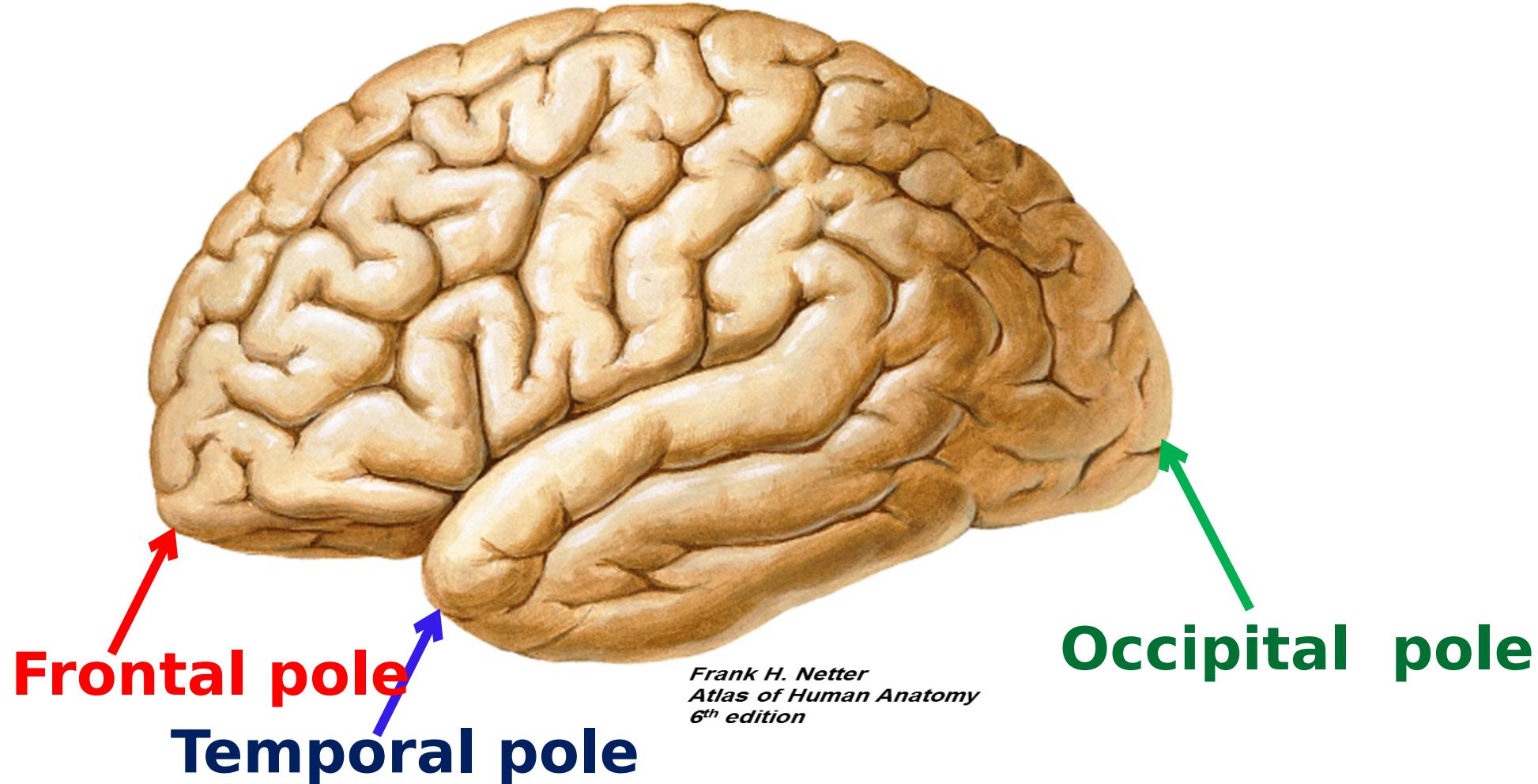
Sulci
Gyri



<https://lh3.googleusercontent.com/AAMq>

Surface of cerebral hemisphere is composed of grey matter (cerebral cortex) that is thrown into grooves “Sulci” separated by folds “Gyri” to increase the surface area of

Each cerebral hemisphere has 3 poles

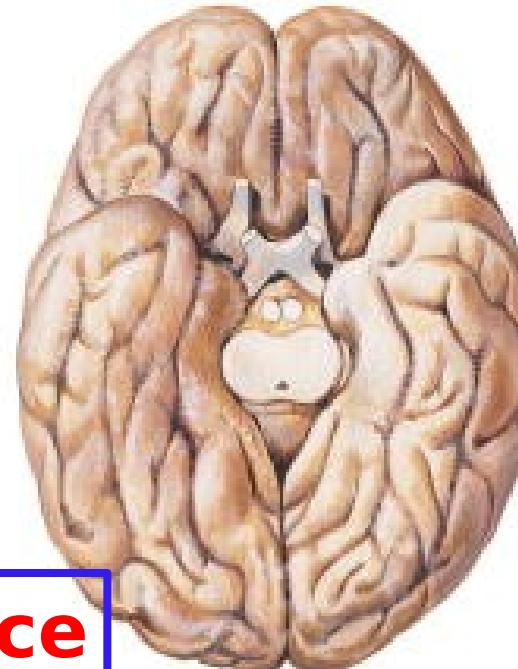


Each cerebral hemisphere has 3 surfaces

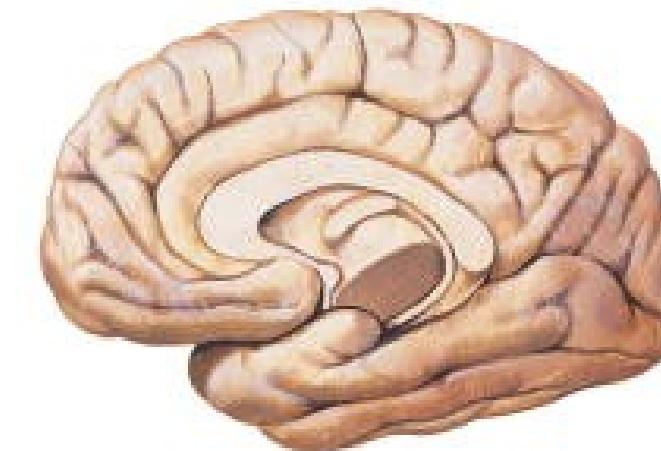


Lateral surface

Frank H. Netter
Atlas of Human Anatomy
6th edition



Inferior surface



Medial surface

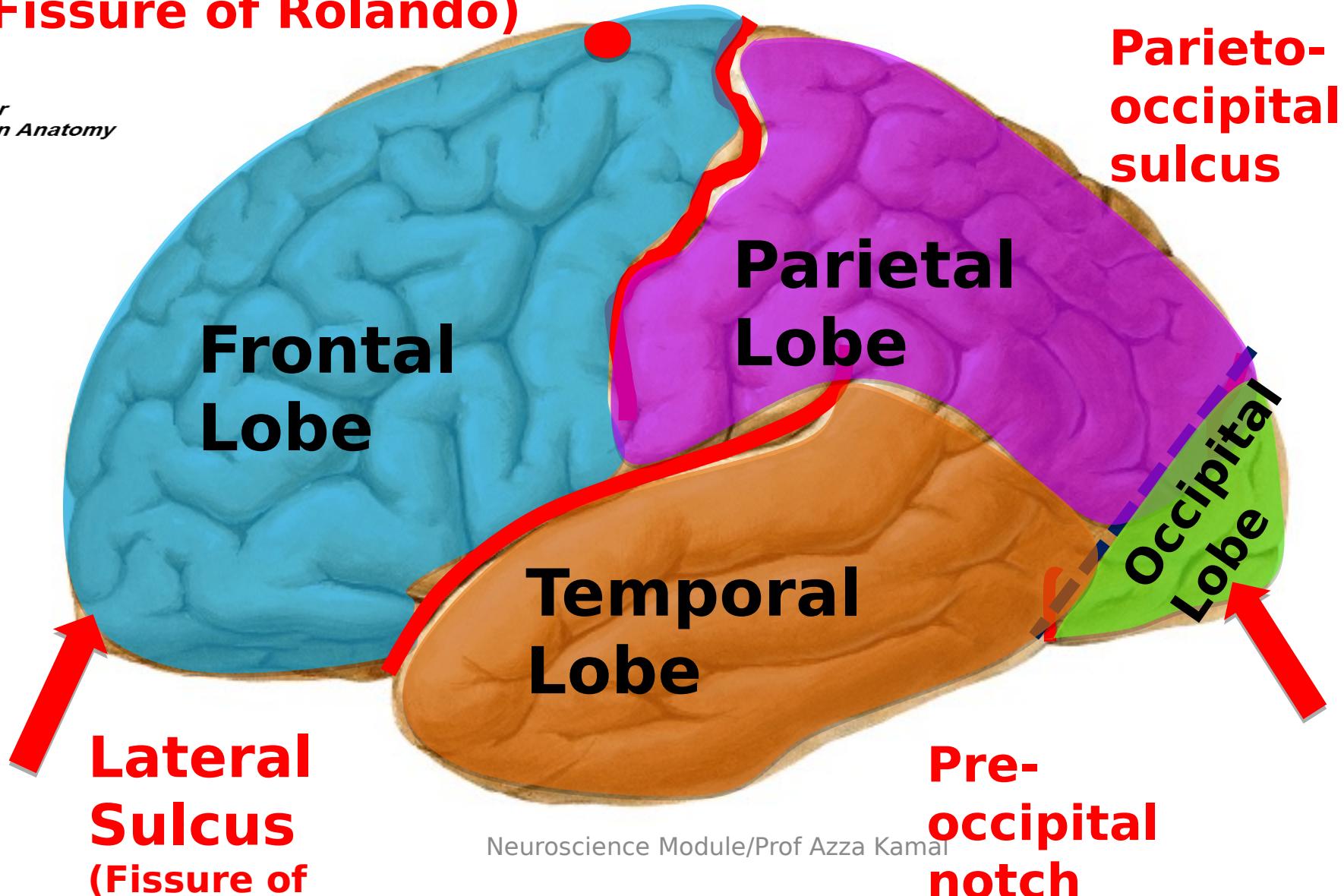
**Main sulci that help
to divide the
cerebral
hemisphere into
lobes:**

Central sulcus

(Fissure of Rolando)

One cm. behind midpoint between
frontal & occipital poles

Frank H. Netter
Atlas of Human Anatomy
6th edition



Other sulci on lateral surface of cerebral hemisphere

Sup frontal s
Inf frontal s

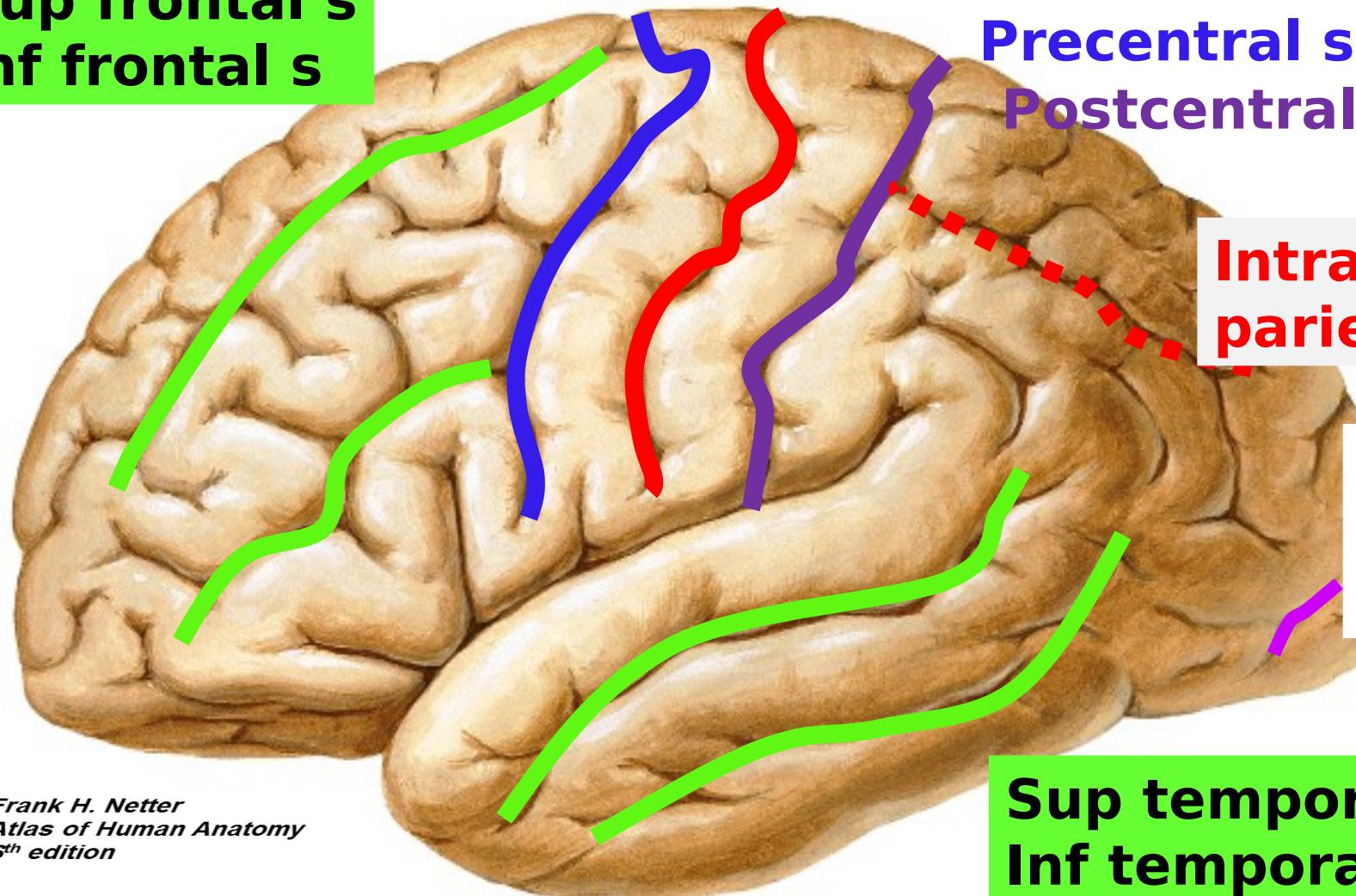
Central sulcus

Precentral sulcus
Postcentral sulcus

Intra-parietal s

Lunate sulcus

Sup temporal s
Inf temporal s



Frank H. Netter
Atlas of Human Anatomy
6th edition

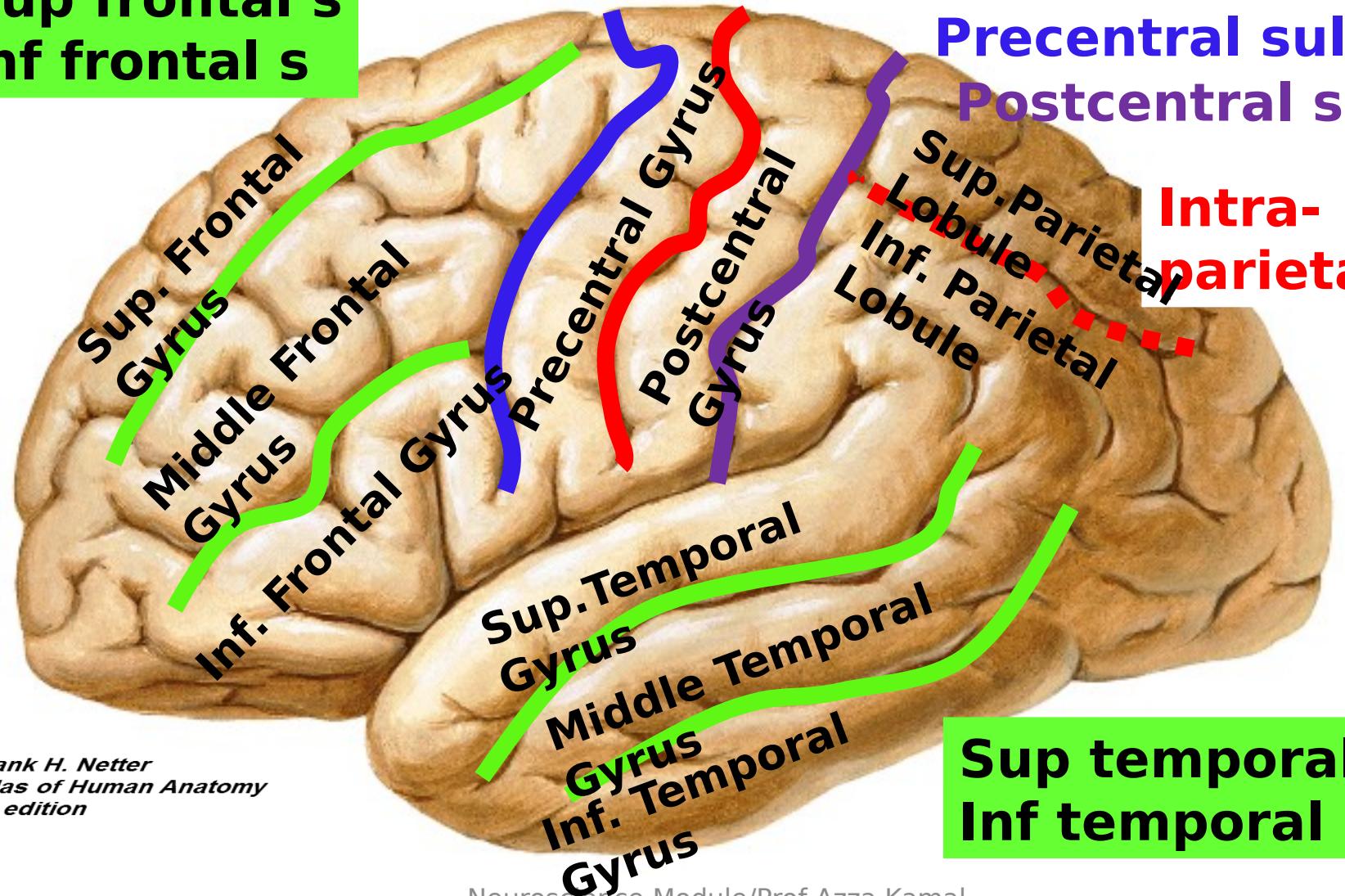
Gyri on lateral surface of cerebral hemisphere

Sup frontal s
Inf frontal s

Central sulcus

Precentral sulcus
Postcentral sulcus

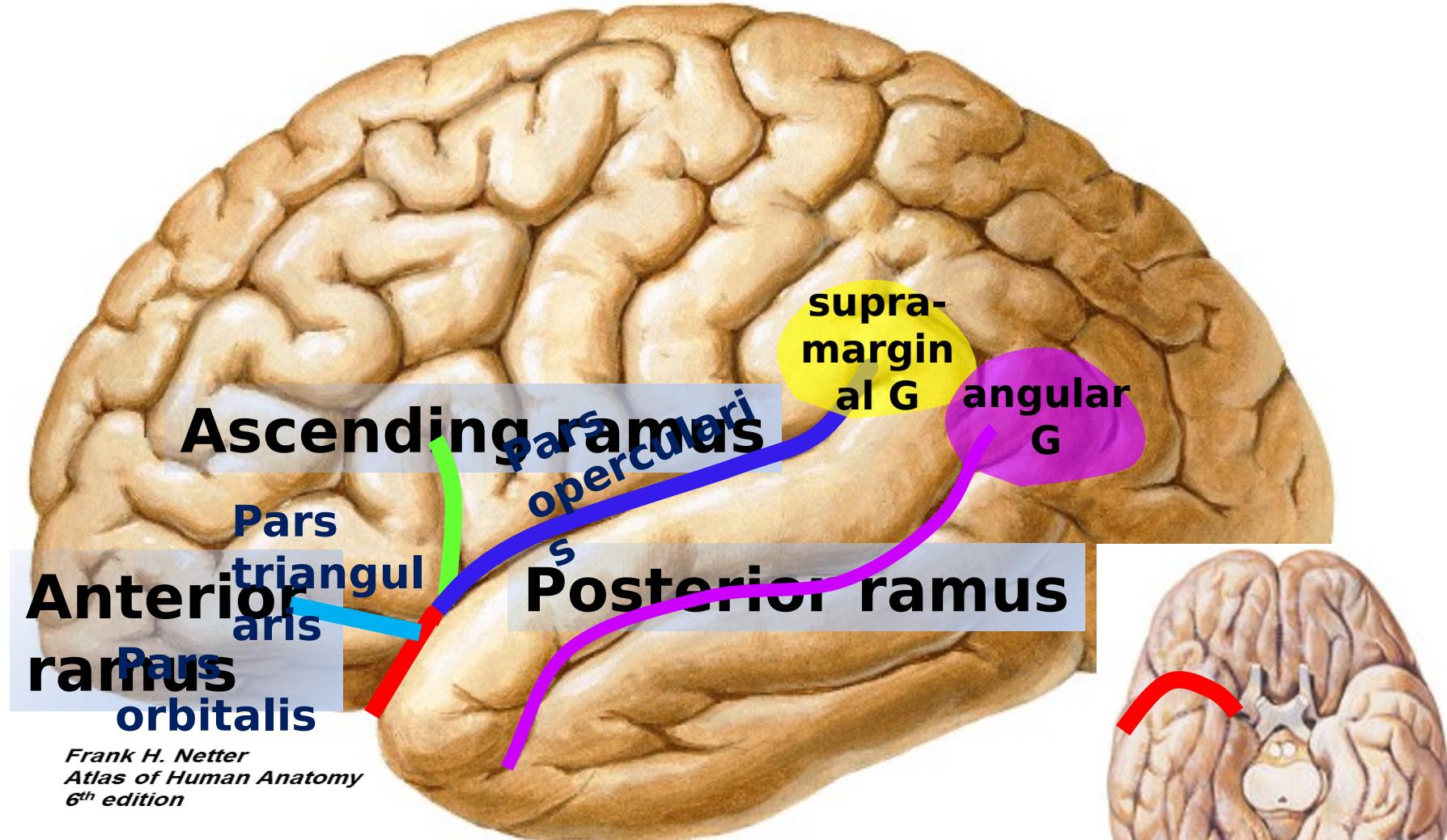
Intra-parietal s



Frank H. Netter
Atlas of Human Anatomy
6th edition

Sup temporal s
Inf temporal s

Lateral sulcus

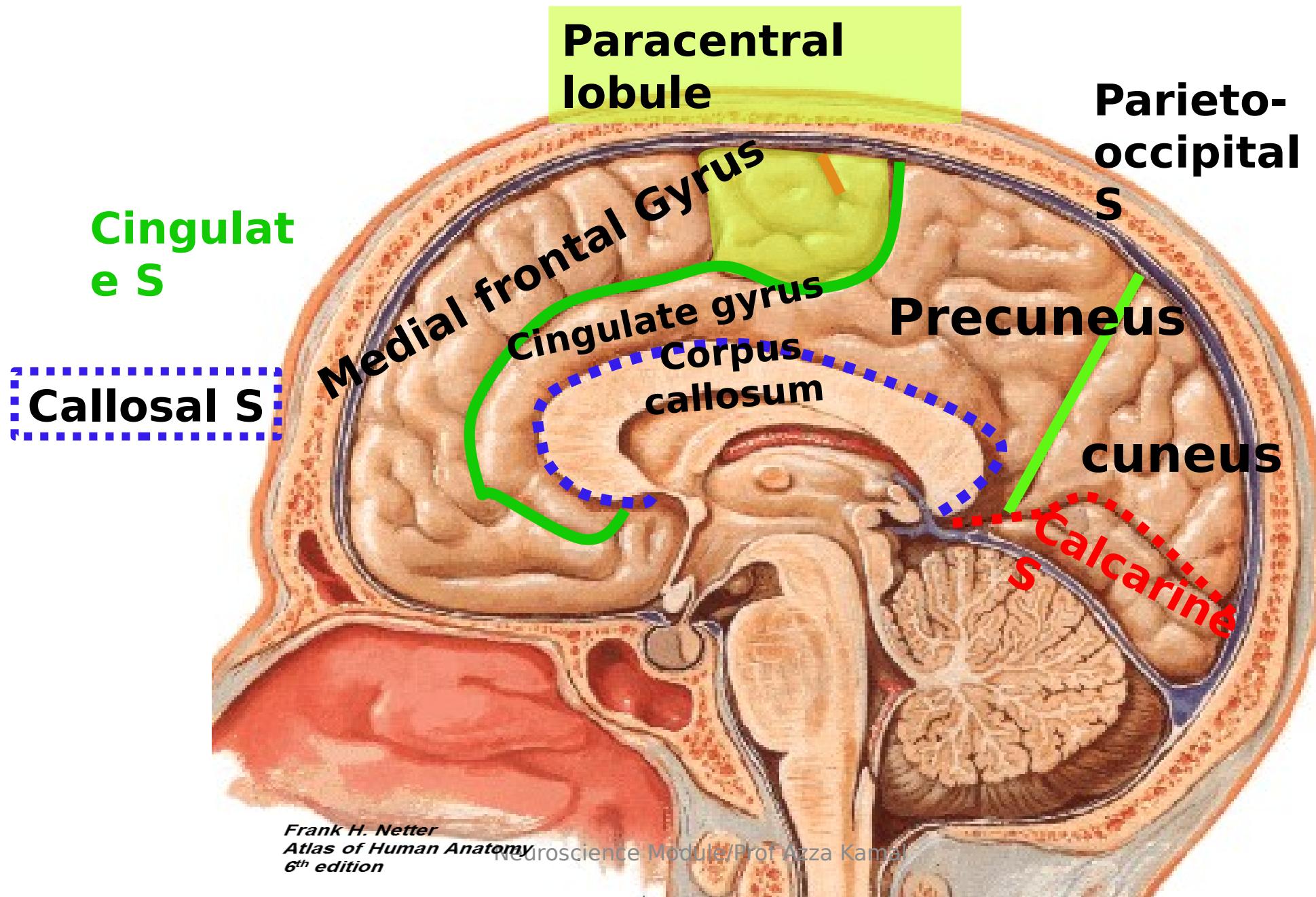


Stem + 3 rami

Neuroscience Module/Prof Azza Kamal

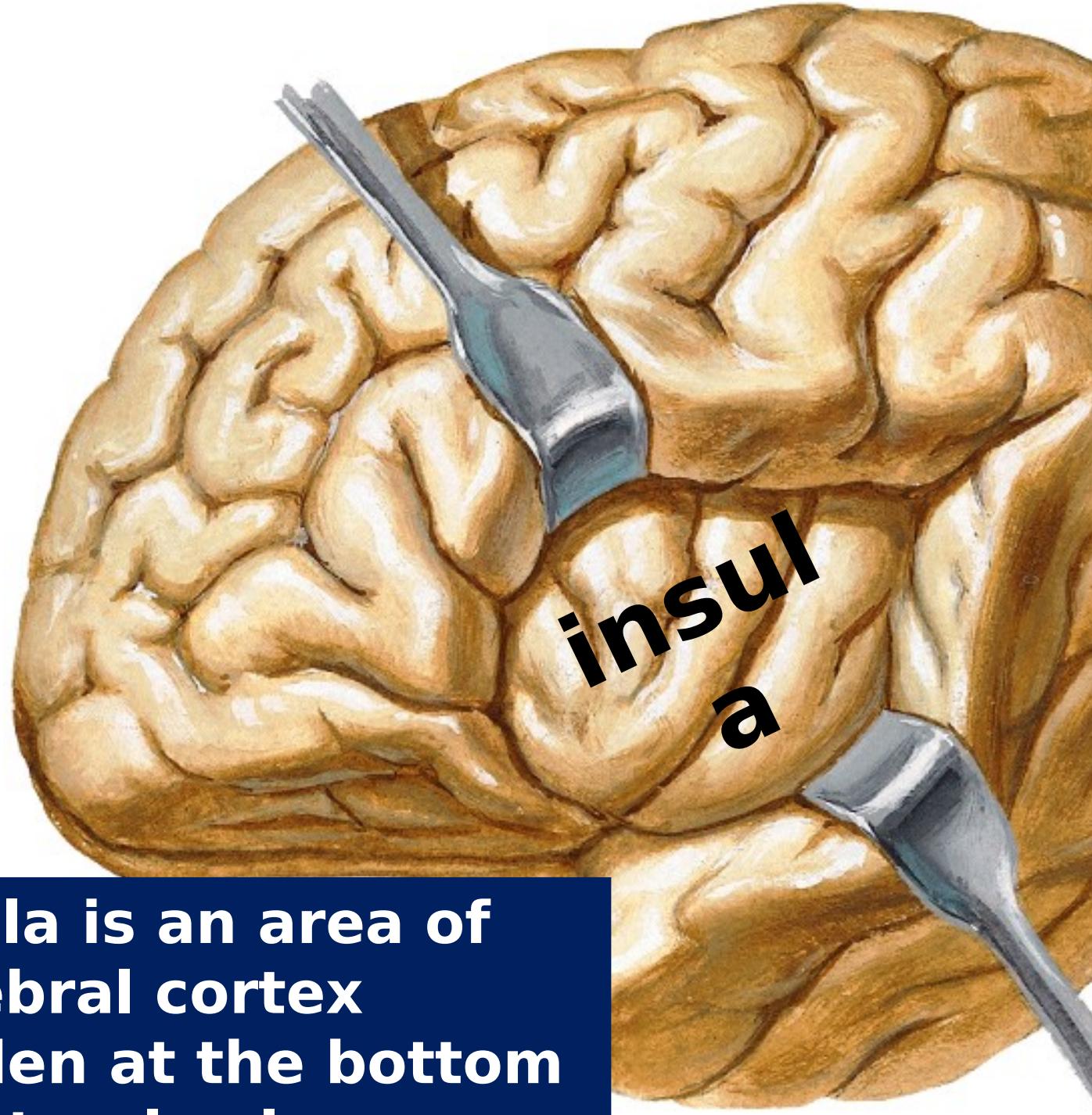
Stem

Sulci & gyri on medial surface of cerebral hemisphere



Frank H. Netter
Atlas of Human Anatomy
6th edition

**Insula is an area of
cerebral cortex
hidden at the bottom
of the brain.**



**Circular
sulcus**

**Central
sulcus**

Insula (Island of Reil)

Frank H. Netter
Atlas of Human Anatomy
6th edition

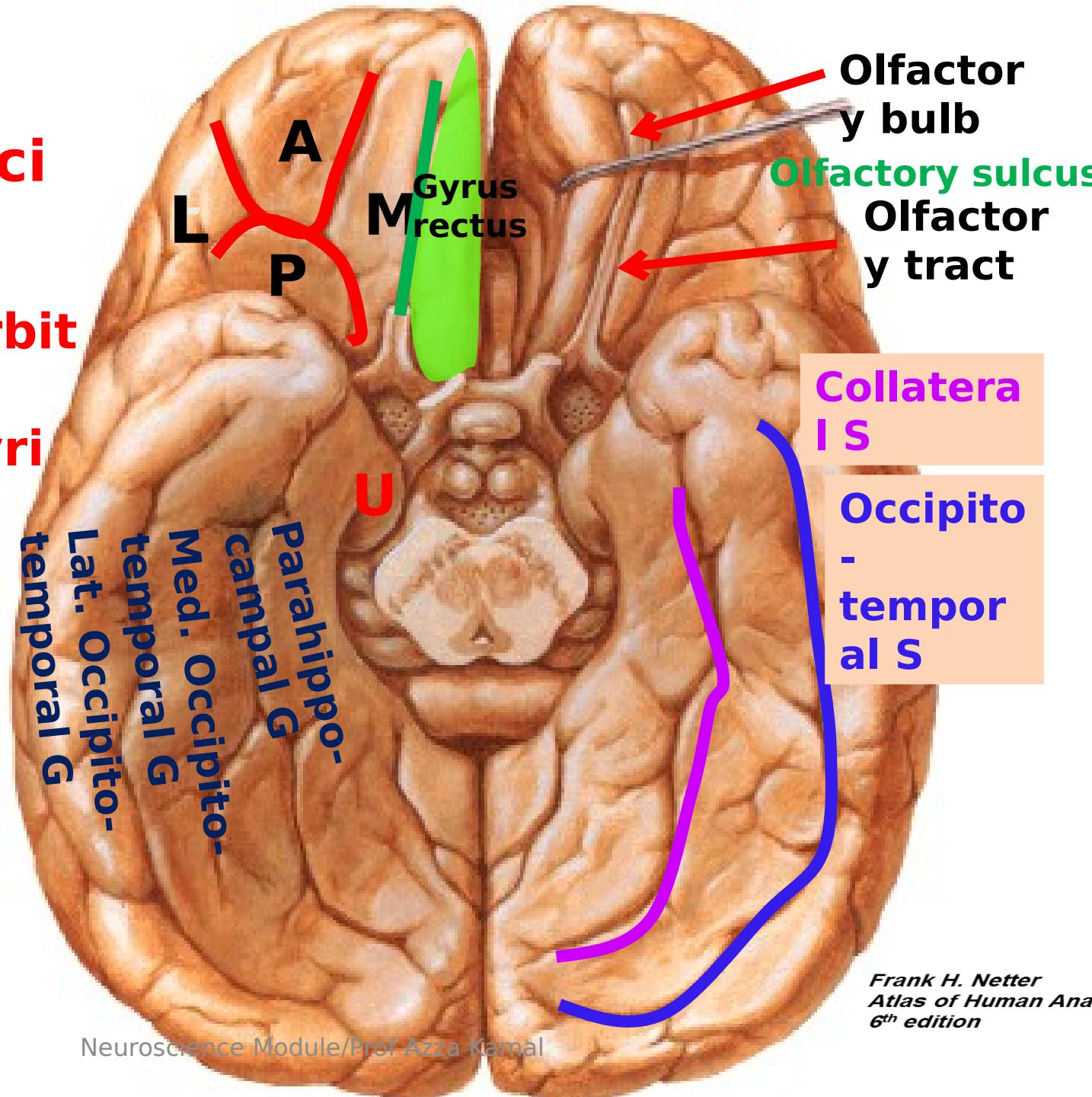
Function of insula:

- 1) Ant. Part ↴ Smell, taste & visceral sensation (autonomic)**
- 2) Post. Part ↴ 2nd somatosensory area**

H-shaped orbital sulci

A □ anterior
P □ posterior
M □ medial
L □ lateral
U □ uncus

Sulci &
Gyri on
inferior



The following is an area of cortex hidden at the bottom of the lateral sulcus:

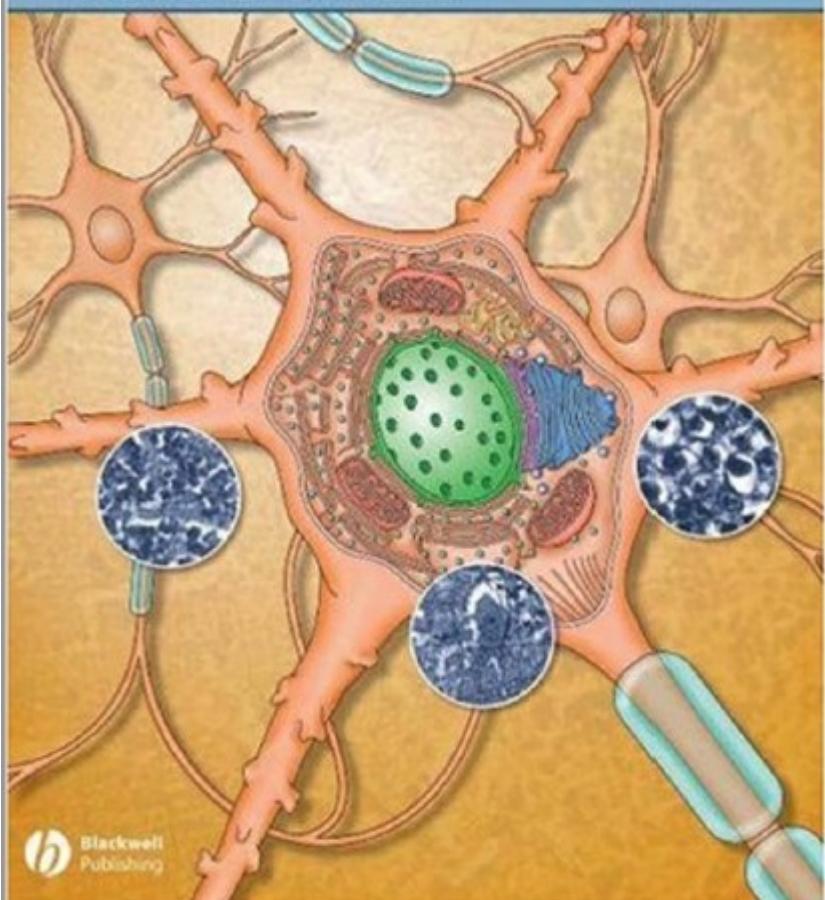
- A.Pars orbitalis
- B.Pars triangularis
- C.Pars opercularis
- D.Cuneus
- E.Insula



a textbook of

NEUROANATOMY

Maria A Patestas • Leslie P. Gartner



Chapter 23: cerebral cortex . PP:402-405

Neuroscience Module/Prof Azza Kamal

Reference:

Clinical Neuroanatomy, Richard Snell, 7th edition
Sulci & gyri : Pages 257-262

**Thank
You**

